No. 849,768. PATENTED APR. 9, 1907.

G. E. BLAKE.

POWER TRANSMITTING DEVICE.

APPLICATION FILED JAN. 10, 1907.

Fig. 2.

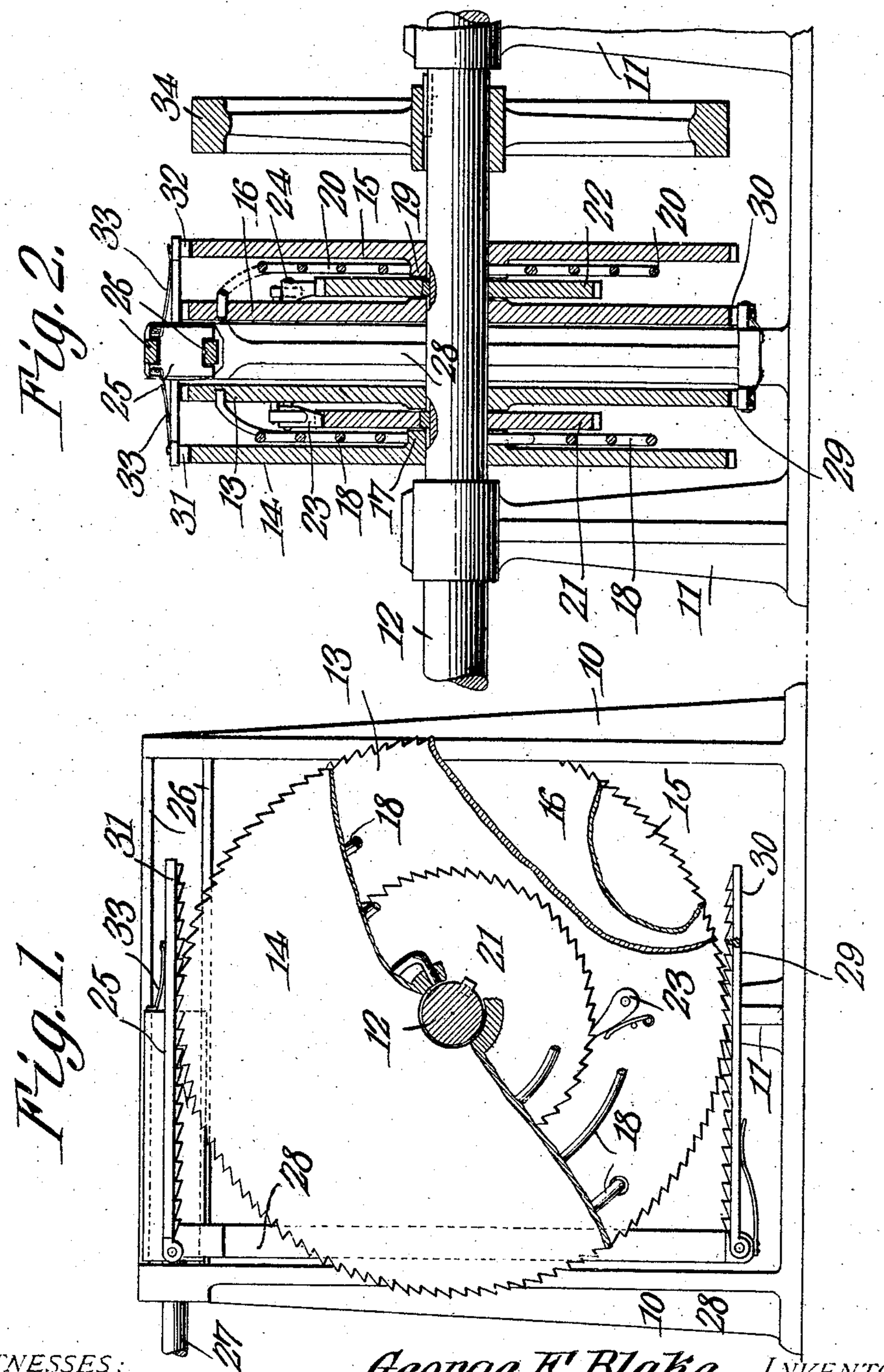

Fig. 1.

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GEORGE EDWARD BLAKE, OF GREENCASTLE, INDIANA.

POWER-TRANSMITTING DEVICE.

No. 849,768. Specification of Letters Patent. Patented April 9, 1907.

Application filed January 10, 1907. Serial No. 351,648.

To all whom it may concern:

Be it known that I, GEORGE EDWARD BLAKE, a citizen of the United States, residing at Greencastle, in the county of Putnam and State of Indiana, have invented a new and useful Power-Transmitting Device, of which the following is a specification.

This invention relates to motors, and has for its principal object to provide improved means for converting reciprocatory into rotary motion, the device being especially valuable in connection with motors of that class in which an explosive charge or a fluid under pressure constitutes the initiatory working force.

A further object of the invention is to provide an improved form of power-transmitting device of such nature that a relatively slow reciprocatory movement may be transmitted in the form of rotary movement at high speed.

A still further object of the invention is to provide a power-transmitting device including a spiral spring, both ends of which are moved during the winding operation, the spring being expanded after each such winding operation and serving to transmit its force at one end thereof to an intermittently-rotating member and at the other end to a continuously-rotatable member—namely, the shaft of the apparatus.

With these and other objects in view, as will more fully hereinafter appear, the invention consists in certain novel features of construction and arrangement of parts hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size, and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings, Figure 1 is a side elevation of a power-transmitting mechanism constructed in accordance with the invention, parts being broken away in order to more clearly illustrate the structure. Fig. 2 is a longitudinal sectional view of the mechanism.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

The apparatus forming the subject of the present invention is designed for use in connection with internal-combustion or other engines of the reciprocatory type and is intended to convert the reciprocating movement into a rotary movement, or it may be employed in connection with any reciprocatory element for the same purpose.

The working parts of the transmitting device are shown as mounted on standards 10 and 11, which latter are provided with bearings for a single shaft 12, to which is imparted a continuous rotary movement, said shaft being connected in any suitable manner to any mechanism to be driven.

Mounted loosely on the shaft 12 are two pairs of ratchet-wheels 13 14 and 15 16, each pair having teeth which face in opposite directions, respectively. The ratchet-wheel 14 is provided with a central hub 17, which is connected to the ratchet-wheel 13 by means of a spiral spring 18, the inner end of said spring being connected to said hub 17, and the ratchet-wheel 15 is provided with a central hub 19, which is connected to the ratchet-wheel 16 by a spiral spring 20, the inner end of said spring being connected to said hub 19.

The shaft carries ratchet-wheels 21 and 22. These ratchet-wheels are rigidly secured to the same shaft 12 and are engaged by pawls 23 and 24, which are carried by ratchet-wheels 13 and 16, respectively, and are pressed into engagement with the ratchet-wheels 21 and 22 by suitable springs or similar devices.

A cross-head 25 slides in guides 26, carried by the standard 10, and said cross-head is connected by a rod 27 to the piston or other member from which the device receives reciprocatory motion. The cross-head 25 is provided with a vertically-extending arm 28, from the end of which extend spring-pressed rack-bars 29 and 30, these rack-bars being arranged to engage with the teeth of ratchet-wheels 13 and 16 and provided with teeth facing in opposite directions to engage the oppositely-facing teeth of the said ratchet-wheels. The cross-head further carries pivoted rack-bars 31 and 32, which are pressed by suitable springs 33 into engagement with ratchet-wheels 14 and 15, respectively, all of the racks being in constant mesh with the ratchet-wheels.

When movement is imparted to the piston-rod 27 or other similar reciprocating

member and the cross-head moves to the right, the racks 29 and 31 operatively engage with the ratchet-wheels 13 and 14, respectively, and these ratchet-wheels are turned in opposite directions, so that the spring that connects them is wound from its inner and its outer ends and is placed under considerable stress. Upon movement of the cross-head in the reverse direction the spring is allowed to uncoil, and in so doing the inner end of the spring operating on the ratchet-wheel 14 will force the said rack 31 to the left, tending to help the return movement of the reciprocatory member from it, while the outer end of the spring, being attached to near the periphery of ratchet-wheel 13, will turn the latter, and similar movement will be transmitted to rack 29 also, helping the return movement of the reciprocatory member. At the same time the pawl 23, carried by ratchet-wheel 13, will operatively engage the teeth of the ratchet-wheel 21 and will impart movement to the shaft 12, so that said shaft will be continuously revolved. During the movement of the cross-head in the reverse direction, or what might be termed the "return" stroke of the cross-head 25, the racks 30 and 32 operatively engage with ratchet-wheels 16 and 15, respectively, and these ratchet-wheels are turned in opposite directions, so that the spring 20 that connects them is wound from its inner and its outer ends and is placed under considerable stress. On movement of the cross-head again in the reverse direction, or what might be termed the "beginning" of another stroke, the spring 20 is allowed to uncoil, and in so doing the inner end of the spring, being attached to hub member of ratchet-wheel 15, will operate said ratchet-wheel and force rack 32 to the right, tending to help the beginning of another stroke, while the outer end of spring 20, being attached to and near the periphery of ratchet-wheel 16, will turn the latter, and similar movement will be transmitted to rack 30, also helping the movement of the reciprocatory member. At the same time the pawl 24, carried by ratchet-wheel 16, will operatively engage the teeth of ratchet-wheel 22 and impart movement to the shaft 12. During the operation just described spring 18 is again being wound by the same process hereinbefore described and the shaft 12 is receiving a fresh impulse at each stroke of the cross-head.

The shaft 12 being provided with a balance or fly wheel 34, with a constantly-recurring impulse, will greatly aid in the continuous rotative movement of the shaft.

As there are two springs operating intermittently and alternately on one shaft, the rotative movement of the shaft is continuous for motive power.

What is claimed is—

1. In apparatus of the class described, a reciprocatory cross-head, two pairs of racks carried thereby, a shaft, two pairs of ratchet-wheels mounted loosely on the shaft and intermeshing with the racks, the ratchet-wheels of each pair being arranged for rotation in opposite directions, respectively, a spiral spring associated with each pair of wheels and having its opposite ends secured to different ratchet-wheels, a ratchet-wheel secured to the shaft adjacent each pair of said wheels, and a pawl carried by one of each pair of loose ratchet-wheels and engaging the adjacent fast ratchet-wheel to thereby transmit unwinding movement of the springs to the shaft.

2. In apparatus of the class described, a reciprocatory cross-head, a pair of sets of racks carried by the cross-head, one set of racks being operable during movement of the cross-head in one direction, and the other set of racks being operable during movement of the cross-head in the opposite direction, a shaft, two pairs of loose ratchet-wheels mounted on the shaft and engaged by one set of racks for movement in opposite directions, respectively, a spring connecting each pair of loose ratchet-wheels, said spring being wound from both ends during operative movement, two ratchet-wheels rigidly secured to the shaft, and two pawls carried by the loose ratchet-wheels and engaging the fast ratchet-wheel to thereby transmit the unwinding movement of the spring to the shaft.

3. In apparatus of the class described, the combination of a reciprocatory member, a pair of racks carried thereby having their teeth facing in opposite directions, a shaft, a pair of ratchet-wheels loosely mounted on the shaft and arranged to be in engagement with the racks, a coil-spring having one end connected adjacent the center of one ratchet-wheel and its other end connected adjacent the periphery of the second wheel, a ratchet-wheel keyed to the shaft, and a pawl on one of the loose ratchet-wheels and arranged to have a ratchet engagement with the said wheel keyed to the shaft.

4. In an apparatus of the class described, the combination of a reciprocatory member, a pair of racks carried thereby having their teeth facing in opposite directions, a shaft, a pair of ratchet-wheels loosely mounted on the shaft and arranged to be in engagement with the racks, a coiled spring having its inner end connected adjacent the center of one loose ratchet-wheel and the outer end connected adjacent the periphery of the second loose ratchet-wheel and arranged for both ends to uncoil at the same time whereby the inner end thereof transmits movement to